PROCEEDINGS

OF

THE ROYAL SOCIETY.

1842. No. 56.

December 8, 1842.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

The following papers were read, viz.:—

1. "Observations on the Blood-corpuscles, particularly with reference to opinions expressed and conclusions drawn in papers 'On the Corpuscles of the Blood,' and 'On Fibre,' recently published in the Philosophical Transactions." By T. Wharton Jones, Esq., F.R.S.

The author points out what he considers to be important errors in the series of papers by Dr. Martin Barry, which have lately appeared in the Philosophical Transactions, and are entitled, "*On the Corpuscles of the Blood,*" and "*On Fibre.*" He alleges that Dr. Barry has generally confounded the colourless corpuscles contained in the blood with the red corpuscles of the same fluid; each of which latter kind consists of a vesicle or cell, with thick walls, but in a collapsed and flattened state, and having therefore a biconcave form, and in consequence of its thick wall being doubled on itself, presenting under the microscope a broad circumferential ring, which is illuminated or shaded differently from the depressed central portion, according to the focal adjustment of the instrument: while the colourless corpuscles, on the other hand, are of a globular shape, strongly refractive of light, and granulated on their surface, and are of less specific gravity and of somewhat larger size than the red corpuscles. The author quotes various passages from Dr. Barry's papers in proof of his assertions, and refers particularly to fig. 23 of his second paper on the corpuscles of the blood. He farther states, that Dr. Barry's description of the appearances of what he terms the red corpuscles, in paragraphs 53, 68, and 76 of his second paper, can, in fact, apply only to the colourless corpuscles: and he observes, that even when Dr. Barry does, at last, in his "Additional Observations," advert to the distinction between the red and the colourless globules, he considers the latter as being merely "the discs" contained in the red globules appearing under an altered state.

The author regards as wholly erroneous the notion which Dr. Barry entertains that a fibre exists in the interior of the blood-corpuscle; and that these fibres, after their escape from thence, constitute the fibres which are formed by the consolidation of the fibrin of the *liquor sanguinis*. The beaded aspect presented by the double contour of the thick wall of the red corpuscle when it has been acted upon either by mechanical causes or by chemical reagents, of which the effect is to corrugate the edge, and to bend it alternately in opposite directions, has, in the opinion of the author, given rise to the illusive appearance of an internal, annular fibre. The appearance of flask-like vesicles presented by some of the red corpuscles, with the alleged fibre protruding from their neck, the author ascribes altogether to the effects of decomposition, which has altered the mechanical properties of the corpuscle, and allowed it to be drawn out, like any other viscid matter, into a thread.

In conclusion, he remarks, that if these statements of Dr. Barry should be recognised as fundamental errors in his premises, the whole of the reasonings built upon them must fall to the ground.

2. "Wind Table, from observations taken at the summit of the Rock of Gibraltar." By Colonel George J. Harding. Communicated by Captain Beaufort, R.N., F.R.S., by order of the Lords Commissioners of the Admiralty.

3. "Spermatozoa observed within the Mammiferous Ovum." By Martin Barry, M.D., F.R.S. L. and Ed.

In examining some ova of a rabbit, of twenty-four hours, the author observed a number of spermatozoa in their interior.

December 15, 1842.

FRANCIS BAILY, Esq., V.P., in the Chair.

His Grace the Duke of Norfolk was balloted for and duly elected a Fellow of the Society.

A paper was read, entitled "Experimental Inquiry into the cause of the Ascent and Continued Motion of the Sap; with a new method of preparing plants for physiological investigations." By George Rainey, Esq., M.R.C.S., Communicated by P. M. Roget, M.D., F.R.S.

The ascent of the sap in vegetables has been generally ascribed to a vital contraction either of the vessels or of the cells of the plant: the circumstances of that ascent taking place chiefly at certain seasons of the year, and of the quantity of fluid, and the velocity of its motion being proportional to the development of those parts whose functions are obviously vital, as the leaves and flowers, have been regarded as conclusive against the truth of all theories which professed to explain the phenomenon on purely mechanical principles. The aim of the author, in the present paper, is to show that these objections are not valid, and to prove, by a series of experiments, that the motion of the sap is totally independent of any vital contractions of the passages which transmit it; that it is wholly a mechanical process, resulting entirely from the operation of endosmose; and that it takes place even through those parts of a plant which have been totally deprived of their vitality.

The lower extremity of a branch of *Valeriana rubra* was placed, soon after being gathered, into a solution of bichloride of mercury. In a few hours a considerable quantity of this solution was absorbed, and the whole plant, which had been previously somewhat shrunk from the evaporation of its moisture, recovered its healthy appearance. On the next day, although the lower portion of the branch had lost its vitality, the leaves and all the parts of the plant into which no bichloride had entered, but only the water of the solution, were perfectly healthy and filled with sap. On each of the following days additional portions of the stem became affected in succession; but the unaffected parts still preserved their healthy appearance, and the flowers and leaves developed themselves as if the plant had vegetated in pure water and the whole stem had been in its natural healthy state. On a minute examination it was found that calomel, in the form of a white substance, had been deposited on the internal surface of the cuticle; but no bichloride of mercury could be detected in those parts which had retained their vitality; thus showing that the solution of the bichloride had been decomposed into chlorine, calomel, and water, and had destroyed the vitality of the parts where this action had taken place; after which, fresh portions of the solution had passed through the substance of the poisoned parts, as if they had been inorganic canals. Various experiments of a similar kind were made on other plants, and the same conclusions were deduced from them.

As the addition of a solution of iodide of potassium converts the bichloride of mercury into an insoluble biniodide, the author was enabled, by the application of this test to thin sections of the stems of plants into which the bichloride had been received by absorption, to ascertain, with the aid of the microscope, the particular portion of the structure into which the latter had penetrated. The result of his observations was, that the biniodide is found only in the intercellular and intervascular spaces, none appearing to be contained within the cavities of either cells or vessels.

As the fluids contained in the vessels and in the cells hold in solution various vegetable compounds, their density is greater than the ascending sap, which is external to them, and from which they are separated by an intervening organized membrane. Such being the conditions requisite for the operation of the principle of endosmose, the author infers that such a principle is constantly in action in living plants; and that it is the cause of the continual transmission of fluids from the intervascular and intercellular spaces into the interior of the vessels and cells, and also of the ascent of the sap.

December 22, 1842.

GEORGE RENNIE, Esq., V.P., in the Chair.

Augustin F. B. Creuze, Esq., and Captain Samuel F. Widdrington, R.N., were balloted for and duly elected Fellows of the Society.

A paper was in part read, entitled "On the Nerves:" by James Stark, M.D., F.R.S.E. Communicated by James F. W. Johnston, Esq., F.R.S., Professor of Chemistry in the University of Durham.

The Society then adjourned over the Christmas recess, to meet again on the 12th of January next.

January 12, 1843.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

1. The reading of a paper, entitled "On the Nerves," by James Stark, M.D., was resumed and concluded.

The author gives the results of his examinations, both microscopical and chemical, of the structure and composition of the nerves; and concludes that they consist, in their whole extent, of a congeries of membranous tubes, cylindrical in their form, placed parallel to one another, and united into fasciculi of various sizes; but that neither these fasciculi nor the individual tubes are enveloped by any filamentous tissue; that these tubular membranes are composed of extremely minute filaments, placed in a strictly longitudinal direction, in exact parallelism with each other, and consisting of granules of the same kind as those which form the basis of all the solid structures of the body; and that the matter which fills the tubes is of an oily nature, differing in no essential respect from butter, or soft fat; and remaining of a fluid consistence during the life of the animal, or while it retains its natural temperature, but becoming granular or solid when the animal dies, or its temperature is much reduced. As oily substances are well known to be non-conductors of electricity, and as the nerves have been shown by the experiments of Bischoff to be among the worst possible conductors of this agent, the author contends that the nervous agency can be neither electricity, nor galvanism, nor any property related to those powers; and conceives that the phenomena are best explained on the hypothesis of undulations or vibrations propagated along the course of the tubes which compose the nerves, by the medium of the oily globules they contain. He traces the operation of the various causes which produce sensation, in giving rise to these undulations; and extends the same explanation to the phenomena of voluntary motion, as consisting in undulations, commencing in the brain, as determined by the will, and propagated to the muscles. He corroborates his views by ascribing the effects of cold in diminishing or destroying both sensibility and the power of voluntary motion, particularly as exemplified in the hybernation of animals, to its mechanical operation of diminishing the fluidity, or producing solidity, in the oily medium by which these powers are exercised.

2. A letter from Prof. Hanson to G. B. Airy, Esq., F.R.S., A.R., was also read, "On a New Method of computing the Perturbations of the Planets whose eccentricities and inclinations are not small." Communicated by G. B. Airy, Esq., F.R.S.

The author announces that he has found a method by which the absolute perturbations of planets for any given time, with any given eccentricity and inclination of the orbit, may be calculated; and he exemplifies his method by applying it to the computation of the perturbations produced by Saturn on the comet of Encke, in every point of its orbit; a problem of which hitherto there existed no solution.

3. A paper was also in part read, entitled "On the minute structure of the Skeletons or hard parts of the Invertebrata." By W. B. Carpenter, M.D. Communicated by the President.

January 19, 1843.

GEORGE RENNIE, Esq., V.P., in the Chair.

John Gould, Esq., Sir Benjamin Heywood, Bart., and Edward Solly, jun., Esq., were balloted for and duly elected Fellows of the Society.

Captain Edward Belcher, R.N., was balloted for, but not elected a Fellow of the Society.

The following papers were read:—

1. "Variation de la Déclinaison et Intensité Horizontale observées à Milan pendant vingt-quatre heures consécutives le 25 et 26 Novembre, et le 21 et 22 Décembre 1842." Par Prof. Carlini, For. Mem. R.S.

2. The reading of a paper, entitled "On the minute structure of the Skeletons or hard parts of Invertebrata," by W. B. Carpenter, M.D., was resumed and concluded.

The present memoir is the first of a series which the author intends to communicate to the Society, and relates only to the Mollusca; and he proposes, hereafter, to extend his inquiries to the skeletons of the Echinodermata, and the various classes of articulated animals. After adverting to the classifications of shells proposed by Mr. Hatchett and Mr. Gray, from the propriety of which he finds reason to dissent, he proceeds to state the results of his microscopic examination of the texture of shells under the several following heads. First, shells having a prismatic cellular structure, as the Pinna, and which are composed of a multitude of flattened hexagonal calcareous prisms, originally deposited in continuous layers of hexagonal cells, and thus constituting a calcified epithelium, analogous with the enamel of the teeth. Secondly, those consisting of membranous shell-substance, the basis of which, after the removal of its calcareous portion, presents nothing but a membranous film, of greater or less consistence, composed of several layers, but without the appearance of any cellular tissue: this membrane the author regards as being derived from the mantle, of which it was originally a constituent part, by the development of nucleolated cells; and the various corrugations and foldings of which it is susceptible in different species, introducing many diversities into the structure of the shells of this class. Thirdly, shells having a nacreous structure, and exhibiting the phenomena of iridescence; a property which the author ascribes to the plicated form of the membrane of the shell, combined with a secondary series of transverse corrugations. Fourthly, shells exhibiting a tubular structure, formed by cylindrical perforations occurring among the several layers, and varying in diameter from about the 20,000th to the 3500th part of an inch; but measuring on an average about the 6000th part of an inch, and presenting a striking analogy with the dentine or ivory of the teeth. The last sections of the paper relate to the epidermis and the colouring matter of shells.

References are made, in many parts of the paper, to illustrative drawings; which, however, the author has not yet supplied.

January 26, 1843.

Sir JOHN WILLIAM LUBBOCK, Bart., V.P. and Treasurer, in the Chair.

The following papers were read, viz.:—

1. "Observations on certain cases of Elliptic Polarization of Light by Reflection," by the Rev. Baden Powell, M.A., F.R.S., Savilian Professor of Geometry in the University of Oxford.

The author, by way of introduction, passes in review the labours of various inquirers on the subject of the elliptic polarization of light, and notices more particularly those of Sir David Brewster, who first discovered this curious property, as recorded in the Philosophical Transactions for 1830; of Mr. Airy, in the Cambridge Transactions for 1831 and 1832; and of Professor Lloyd, in the Philosophical Transactions for 1840, and in the Reports of the British Association for 1841. He then proceeds to give an account of his own experimental examination of the phenomena of elliptic polarization in the reflection of light from various surfaces, by observing the modifications of the polarized rings under different conditions, both of surface and of incidence, and by endeavouring to ascertain both the existence and amount of ellipticity, as shown by the dislocation of those rings, and to determine its peculiar character, as indicated by the direction in which the dislocation takes place; the protrusion of the alternate quadrants appearing, in certain cases, in one direction, and in others in the opposite. These observations are reducible to two classes; first, those designed to contribute to the inquiry, what substances possess the property of elliptic polarization, by examining the light reflected from various bodies; and second, those made on certain cases of films of several kinds, including those formed on metals by oxidation or other action upon the metal itself, as well as by extraneous deposition. The author found the general result, in all these cases, to be, that from any one tint to another, through each entire order of tints, the form of the rings in the reflected light undergoes certain regular changes; passing from a dislocation in one direction to that in the opposite, through an intermediate point of no dislocation, or of plane polarization; and thus exhibiting a dark and a bright centred system alternately, as long as the order of tints are preserved pure. These changes in the form of the rings, he observes, are precisely those expressed by successive modifications of Mr. Airy's formula, corresponding to the increments in the retardation which belong to the periodical colours of the films.

The remaining portion of the paper is occupied by a description of the apparatus and mode of conducting the experiments; and of the observations made on mica, on decomposed glass, plumbago, daguerreotype, and other metallic plates, and on the coloured films produced on steel and on copper by the action of heat, and of voltaic electricity. The author gives, in conclusion, an analytical investigation of Mr. Airy's general formula.

2. "Variation of the Magnetic Needle as observed at Washington City, D. C., from 3^h 30^m July 24th to 3^h July 25th, 1840, inclusive (Göttingen mean time)," by Lieut. Gillies, of the United States Service. Communicated by Samuel Hunter Christie, Esq., Sec. R.S.

February 2, 1843.

Sir JOHN WILLIAM LUBBOCK, Bart., V.P. and Treasurer, in the Chair, succeeded by the MARQUIS OF NORTHAMPTON, the President, in the Chair.

John Benjamin Heath, Esq., James MacCullagh, Esq., and George Owen Rees, M.D., were balloted for and duly elected Fellows of the Society.

A paper was read, entitled "Experimental Researches in Electricity:" Eighteenth Series; by Michael Faraday, Esq., D.C.L., F.R.S. Section 25. On the Electricity evolved by the Friction of Water and Steam against other bodies.

The object of the experiments related in this paper, is to trace the source of the electricity which accompanies the issue of steam of high pressure from the vessels in which it is contained. By means of a suitable apparatus, which the author describes and delineates, he found that electricity is never excited by the passage of pure steam, and is manifested only when water is at the same time present; and hence he concludes that it is altogether the effect of the friction of globules of water against the sides of the opening, or against the substances opposed to its passage, as the water is rapidly moved onwards by the current of steam. Accordingly it was found to be increased in quantity by increasing the pressure and impelling force of the steam. The immediate effect of this friction was, in all cases, to render the steam or water positive, and the solids, of whatever nature they might be, negative. In certain circumstances, however, as when a wire is placed in the current of steam at some distance from the orifice whence it has issued, the solid exhibits the positive electricity already acquired by the steam, and of which it is then merely the recipient and the conductor. In like manner, the results may be greatly modified by the shape, the nature, and the temperature of the passages through which the steam is forced. Heat, by preventing the condensation of the steam into water, likewise prevents the evolution of electricity, which again speedily appears by cooling the passages so as to restore the water which is necessary for the production of that effect. The phenomenon of the evolution of electricity in these circumstances is dependent also on the quality of the fluid in motion, more especially in relation to its conducting power. Water will not excite electricity unless it be pure; the addition to it of any soluble salt or acid, even in minute quantity, is sufficient to destroy this property. The addition of oil of turpentine, on the other hand, occasions the development of electricity of an opposite kind to that which is excited by water; and this the author explains by the particles or minute globules of the water having each received a coating of oil in the form of a thin film, so that the friction takes place only between that external film and the solids, along the surface of which the globules are carried. A similar, but a more permanent effect is produced by the presence of olive oil, which is not, like oil of turpentine, subject to rapid dissipation.

Similar results were obtained when a stream of compressed air was substituted for steam in these experiments. When moisture was present, the solid exhibited negative, and the stream of air positive electricity; but when the air was perfectly dry, no electricity of any kind was apparent. The author concludes with an account of some experiments in which dry powders of various kinds were placed in the current of air; the results differed according to the nature of the substances employed, and other circumstances.

February 9, 1843.

Sir JOHN WILLIAM LUBBOCK, Bart., V.P. and Treasurer, in the Chair.

The following papers were read, viz.—

1. "Magnetical Term-Observations made at the Observatory at Prague, for September, October, November and December, 1842:" by Professor Kreil. Communicated by S. Hunter Christie, Esq., Sec. R.S.

2. "On the Structure and Mode of Action of the Iris:" by C. R. Hall, Esq. Communicated by P. M. Roget, M.D., Sec. R.S.

After reciting the various discordant opinions entertained at different periods by anatomists and physiologists, relative to the structure and actions of the iris, the author proceeds to give an account of his microscopical examination of the texture of this part of the eye, in different animals. He considers the radiated plicæ, which are seen on the uvea in Mammalia, as not being muscular; but he agrees with Dr. Jacob in regarding them as being analogous in structure to the ciliary processes. The white lines and elevations apparent on the anterior surface of the human iris, he supposes to be formed by the ciliary nerves which interlace with one another in the form of a plexus. The iris, he states, is composed of two portions; the first, consisting of a highly vascular tissue, connected by vessels with the choroid, ciliary processes, sclerotica and cornea, and abundantly supplied with nerves, which, in the human iris, appear, in a front view, as thread-like striæ; and which are invested, on both surfaces, by the membrane of the aqueous humour. They are more or less thickly covered with pigment, which, by its varying colour, imparts to the iris on the anterior surface its characteristic hue; and, by its darkness on the posterior surface, renders an otherwise semi-transparent structure perfectly opake. The second component portion of the iris consists of a layer of concentric muscular fibres, which fibres, in Man and Mammalia generally, are situated on the posterior surface of the pupillary portion of the iris; but which in Birds extend much nearer to the ciliary margin, and consequently form a much broader layer. In Fishes and in some Reptiles they do not exist at all.

The author then proceeds to inquire into the bearings which these conclusions may have on the physiology of the iris. He thinks that the phenomena of its motions can receive no satisfactory explanation on the hypothesis of erectility alone, or on that of the antagonism of two sets of muscular fibres; the one for dilating, the other for contracting the pupil. He is convinced that the contraction of the pupil is the effect of muscular action; but does not consider the knowledge we at present possess is sufficient to enable us to determine the nature of the agent by which its dilatation is effected. He, however, throws it out as a conjecture, that this latter action may be the result of an unusual degree of vital contractility, residing either in the cellular tissue, or in the minute blood-vessels of the iris. It is from elasticity, he believes, that the iris derives its power of accommodation to changes of size, and its tendency to return to its natural state from extremes, either of dilatation or of contraction; but beyond this, elasticity is not concerned in its movements.

February 16, 1843.

GEORGE RENNIE, Esq., V.P., in the Chair.

The following papers were read, viz.—

1. "Tide-Observations at Tahiti:" by Captain Edward Belcher, R.N. Communicated by Captain Beaufort, R.N., F.R.S., &c.

This paper consists of copies of the Tide Journal, registered at the Island of Motuatu, in the Harbour of Papeete, and of a short comparative series made at Point Venus. They were conducted by Mr. McKinley Richardson, Mate. The construction of the tide-gauge is described; and an account is given of the methods of observation, and of the precautions adopted to ensure accuracy. The results are specified in the following letter from the author to Captain Beaufort, which accompanies the paper:—

"Her Majesty's Ship Sulphur, Woolwich, August 2, 1842.

"Sir,—Referring to the Tide Registries, forwarded on my arrival, I beg leave to offer the following general remarks upon the tides at Tahiti.

"In consequence of your very special instructions relative to the determination of the *actual periods* of high water at the Island of Tahiti, the most minute attention was paid to this subject; and as these periods could only be *approximated*, recourse was had to my old method (successfully practised in the Lancashire survey), of deriving them from the Equal-altitude system.

"By a reference to the Tide Registry annexed, it will be found that there are *two distinct periods of high water*, during each interval of twenty-four hours; and that during the seven days preceding, and seven days following the full and change, they are confined between the limits of 10 A.M. and 2^h 30^m P.M., the whole range of interval, by day as well as by night, being about 4^h 27^m.

"Commencing with the seventh day preceding the full moon, viz. the 9th of April, it will be perceived that high water occurs at 10 A.M., this being the greatest A.M. interval from noon; and that on the 16th, at the full moon, it occurs nearly at noon.

"Passing on to the 23rd, it reaches the greatest P.M. limit at 2^h 30^m, and on the 2nd of May again reaches the noon period.

"Between the 23rd and 24th, however, a sudden anomaly presents itself. Throughout the day of the 23rd, the variation of the level does not exceed 2½ inches, and the general motion is observed to be 'irregular.' The time of high water is also the extreme P.M. limit.

"On the 24th we discover that it has suddenly resumed *the most distant* A.M. *period*, viz. 10 A.M., but proceeds regularly to the noon period at the change.

"Although the differences of level do not at full and change exceed 1 foot 4½ inches, still I presume that we have sufficient data to establish the fact,—that it is *not invariably high water at noon* (as asserted by Kotzebue, Beechey and others); and, further, that we have corresponding *nightly periods* of high water.

"It is evident that the time of high water at full and change may be assumed as that of noon, because we have sufficiently decided changes of level to fix the approximate period of high water.

"It does not appear by these Registers, that any higher levels result from the rollers sent in by the strong sea breezes (as asserted by several writers), but rather the contrary, the highest levels being indicated during the night, when the land breezes prevailed.

"I have great satisfaction in presenting you with these facts, and trust that they may induce others to follow up the same experiments, so as, eventually, to obtain the variations which other seasons may produce.

"I am, Sir, your most obedient servant,

"EDWARD BELCHER, *Captain*."

"*Captain Beaufort, R.N., F.R.S., Hydrographer*."

2. "On Fissiparous Generation:" by Martin Barry, M.D., F.R.S. L. and Ed.

The author observes that the blood-corpuscle and the germinal vesicle resemble one another in the circumstance of an orifice existing in the centre of the parietal nucleus of both. He pursues the analogy still farther, conceiving that as a substance of some sort is introduced into the ovum through its orifice, which the author terms *the point of fecundation*, so the corpuscles of the blood may undergo a sort of fecundation through their corresponding orifice; and also that the blood-corpuscle, like the germinal vesicle, is propagated by self-division of its nucleus; a mode of propagation which he believes to be common to cells in general. The nucleus of the germinal vesicle, or original parent cell of the ovum, gives origin, by self-division, to two young persistent cells, endowed with qualities resulting from the fecundation of the parent cell; these two cells being formed by assimilation, out of a great number of minuter cells which had been previously formed. This account of the process, which takes place in the reproduction of the entire organism, explains, according to Dr. Barry, the mysterious reappearance of the qualities of both parents in the offspring.

Certain nuclei, which the author has delineated in former papers as being contained within and among the fibres of the tissues, he conceives to be, in like manner, centres of assimilation, from observing that they present the same sort of orifice, that they are reproduced by self-division, and that they are derived from the original cells of development; that is, from the nuclei of the corpuscles of the blood. He considers that assimilation of the substance introduced into the parietal nucleus of the cell is part of the process which propagates the cell; that the mode of reproduction of cells is essentially fissiparous, and that the process of assimilation prepares them for being cleft.

A pellucid point is described by the author as being "contained in a certain part of the cell-wall, and as representing the situation of a highly pellucid substance, originally having little if any colour." This substance, which he considers as being primogenital and formative, he denominates *hyaline*, and ascribes to it the following properties. It appropriates to itself new matter, thus becoming enlarged; then divides and subdivides into globules, each of which passes through changes of the same kind. Under certain circumstances, it exhibits a contractile power, and performs the motions called *molecular*. It is the seat of fecundation, and it is by its successive divisions that properties descend from cell to cell, new properties being continually acquired as new influences are applied; but the original constitution of the hyaline not being lost. The main purpose for which cells are formed is to reproduce the hyaline; and this they do by effecting the assimilation which prepares it to divide; such division being thus the essential part of fissiparous generation.

The remaining part of the paper is occupied with a detailed account of these processes as they occur in the development of the ovum, and also in the changes exhibited by the corpuscles of the blood, in which fissiparous reproduction also takes place, and the red blood-discs are converted into fibrin, and thus give origin to the various tissues of the organs. The same theory of fissiparous reproduction he also applies to the formation of the muscular fibre, in connexion with his belief that it is composed of a double spiral filament. Contractile cilia, he supposes, are also formed by the elongation of nuclei, the filaments proceeding from them in opposite directions. The author considers, lastly, the subject of the fissiparous reproduction of the Infusoria, and particularly of the *Volvox globator*, the *Chlamido-monas*, *Baccillaria*, *Gonium*, and the *Monadina* in general; and applies the same theory to gemmiparous reproduction, and to the so-called spontaneous generation of infusoria and parasitic entozoa.

February 23, 1843.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

James Meadows Rendel, Esq., was balloted for, and duly elected a Fellow of the Society.

The following papers were read, viz.—

1. "Researches on the Decomposition and Disintegration of Phosphatic Vesical Calculi; and on the introduction of Chemical

decomponents into the living Bladder." By S. Elliott Hoskins, M.D Communicated by P. M. Roget, M.D., Sec. R.S.

The object of these researches was the discovery of some chemical agent, more energetic in its action on certain varieties of human calculi, and less irritating when injected into the bladder, than any of the fluids hitherto employed.

These indications not being fulfilled by dilute acids, or other solvents which act by the exertion of single elective affinity, the author investigated the effects of complex affinity in producing decomposition, and consequent disintegration, of vesical calculi.

For this purpose an agent is required, the base of which should unite with the acid of the calculus, whilst the acid of the former should combine and form soluble salts with the base of the latter. The combined acids would thereby be set free in definite proportions, to be neutralized in their nascent state, and removed out of the sphere of action, before any stimulating effect could be exerted on the animal tissue.

These intentions the author considers as having been fulfilled by the employment of weak solutions of some of the vegetable supersalts of lead; such as the supermalate, saccharate, lactate, &c. The preparation, however, to which he gives the preference, is an acid saccharate, or, as he calls it, a *nitro-saccharate of lead.*

The salt, whichsoever it may be, must be moistened with a few drops of acetic, or of its own proper acid, previous to solution in water, whereby alone perfect transparency and activity are secured. He furthermore states, that the decomposing liquid should not exceed in strength one grain of the salt to each fluid-ounce of water, as the decomposing effect is in an inverse ratio to its strength.

Having by experiments which are fully detailed ascertained the chemical effects of the above class of decomponents on calculous concretions *out* of the body, the author briefly alludes to the cases of three patients, in each of whom from four to eight ounces of these solutions had been repeatedly, for weeks together, introduced into the bladder, and retained in that organ without inconvenience for the space of from ten to fifty minutes.

It not being the intention of the author to enter into the medical history of these cases, he merely cites the above facts as sufficient to establish the principle originally laid down; namely, chemical decomposition of phosphatic calculi, by means of solutions so mild as to be capable of retention in the living human bladder without irritation or inconvenience.

2. "A Method of proving the three leading properties of the Ellipse and the Hyperbola from a well-known property of the Circle." By Sir Frederick Pollock, Knt., F.R.S., Her Majesty's Attorney General. Communicated in a letter to P. M. Roget, M.D., Secretary to the Royal Society.

In this communication, the author first demonstrates the well-known property of the circle, that if from a point in the diameter produced there be drawn a tangent to the circle, and from the point of contact there be drawn a line perpendicular to the diameter; and if from any point in the circumference there be drawn two lines, one to the point without the circle, and another to the foot of this perpendicular, the former of these lines will be to the latter, as the distance of the point without the circle from the centre, is to the radius of the circle. By means of this property, and assuming that the ellipse is the curve whose ordinate, at right angles to its axis, is to the corresponding ordinate of the circle, described upon this axis as a diameter, in a constant ratio, the author proves the following propositions relating to this cûrve:—

1. The rectangle of the abscissæ is to the square of the ordinate, as the square of the semiaxis major to the difference of the squares of the semiaxis major and the excentricity.

2. The distance of any point in the curve from the focus, is to its distance from the directrix, as the excentricity is to the semiaxis major.

3. The sum of the distances of any point in the curve from the two foci is equal to the axis major.

By a method nearly similar to that employed for the ellipse, and assuming that the hyperbola is a curve in which the rectangle of the abscissæ is to the square of the ordinate, as the square of the ordinate in a circle, described upon the axis major as a diameter, is to the square of the subtangent, the author shows, first, that the distance of any point in the curve from the focus is to its distance from the directrix, as the distance between the foci is to the axis major; and secondly, that the difference of the distances of any point in the curve from the two foci is equal to the axis major.

3. "On the diurnal Temperature of the Earth's surface, with the discussion of a simple formula for ascertaining the same." By S. M. Drach, Esq., F.R.A.S. Communicated by John Lee, Esq., LL.D., F.R.S.

The author investigates the several causes which influence the daily temperature of any point at the earth's surface. He employs the term *Thermal establishment* to denote the retardation of the effects of solar light caused by atmospherical conduction and by local circumstances, in the same manner that the term *Tidal establishment* has been used to express the local constant by which the astronomical effects on the waters of the ocean are delayed. After explaining the formation of the tables and diagrams given at the end of the paper, and detailing the conclusions derivable from them, the author enters into a review of the perturbing causes, investigates the analytical expression for the daily heat, and concludes with some observations on isothermal lines, on the influence of the friction resulting from the rotation of the earth about its axis, and on the agency of electricity.

March 2, 1843.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

1. A paper was read, entitled, "On the Laws of Individual Tides at Southampton and at Ipswich." By G. B. Airy, Esq., M.A., F.R.S., Astronomer Royal.

The author gives the results of his own personal observations of the tides at Southampton and at Ipswich, in both of which places they present some remarkable peculiarities. In conducting these inquiries he obtained, through the favour of Colonel Colby, R.E., and Lieut. Yelland, R.E., the able assistance of non-commissioned officers and privates of the corps of Royal Sappers and Miners. He explains in detail the nature of his observations, and the method he pursued in constructing tables of mean results; and deduces from them the conclusion, that the peculiarities in the tides which are the object of his investigation are not dependent on any variations in the state of the atmosphere, but are probably connected with the laws which regulate the course of waves proceeding along canals.

2. A paper was in part read, entitled, "On the Special Function of the Skin." By Robert Willis, M.D. Communicated by John Bostock, M.D., F.R.S.

March 9, 1843.

Sir JOHN WILLIAM LUBBOCK, Bart., V.P. and Treasurer, in the Chair.

John Miers, Esq., was balloted for, and duly elected a Fellow of the Society.

1. The reading of a paper, entitled, "On the Special Function of the Skin." By Robert Willis, M.D. Communicated by John Bostock, M.D., F.R.S., was resumed and concluded.

The purpose which is answered in the animal economy by the cutaneous exhalation has not hitherto been correctly assigned by physiologists: the author believes it to be simply the elimination from the system of a certain quantity of pure water, and he considers that the saline and other ingredients which pass off at the same time by the skin are in too inconsiderable a quantity to deserve being taken into account. He combats by the following arguments the prevailing opinion, that this function is specially designed to reduce or to regulate the animal temperature. It has been clearly shown by the experiments of Delaroche and Berger, that the power which animals may possess of resisting the effects of a surrounding medium of high temperature is far inferior to that which has been commonly ascribed to them; for in chambers heated to 120° or 130° Fahr., the temperature of animals is soon raised to 11° or even 16° above what it had been previously, and death speedily ensues. The rapid diminution or even total suppression of the cutaneous exhalation, on the other hand, is by no means followed by a rise in the temperature of the body. In general dropsies, which are attended with a remarkable diminution of this secretion, an icy coldness usually pervades both the body and the limbs. A great fall in the animal temperature was found by Fourcauld, Becquerel and Breschet to be the effect of covering the body with a varnish impervious to perspiration; and so serious was the general disturbance of the functions in these circumstances, that death usually ensued in the course of three or four hours.

The question will next arise, how does it happen that health and even life can be so immediately dependent as we find them to be on the elimination of so small a quantity of water as thirty-three ounces from the general surface of the body in the course of twenty-four hours? To this the author answers, that such elimination is important as securing the conditions which are necessary for the endosmotic transference between arteries and veins of the fluids which minister to nutrition and vital endowment. It is admitted by physiologists that the blood, while still contained within its conducting channels, is inert with reference to the body, no particle of which it can either nourish or vivify until that portion of it which has been denominated the *plasma* has transuded from the vessels and arrived in immediate contact with the particle that is to be nourished and vivified: but no physiologist has yet pointed out the efficient cause of these tendencies of the plasma, first, to transude through the wall of its efferent vessels, and secondly, to find its way back again into the afferent conduits. The explanation given by the author is that, in consequence of the out-going current of blood circulating over the entire superficies of the body perpetually losing a quantity of water by the action of the sudoriparous glands, the blood in the returning channels has thereby become more dense and inspissated, and is brought into the condition for absorbing, by endosmosis, the fluid perpetually exuding from the arteries, which are constantly kept on the stretch by the injecting force of the heart.

In an appendix to the paper, the author points out a few of the practical applications of which the above-mentioned theory is susceptible. Interference with the function of the skin, and principally through the agency of cold, he observes, is the admitted cause of the greater number of acute diseases to which mankind, in the temperate regions of the globe, are subject. He who is said to have suffered a chill, has, in fact, suffered a derangement or suppression of the secreting action of his skin, a process which is altogether indispensable to the continuance of life; and a disturbance of the general health follows as a necessary consequence. Animals exposed to the continued action of a hot dry atmosphere die from exhaustion; but when subjected to the effects of a moist atmosphere of a temperature not higher than their own, they perish much more speedily; being destroyed by the same cause as those which die from covering the body with an impervious glaze; for, in both cases, the conditions required for the access of oxidized, and the removal of deoxidized plasma, are wanting, and life necessarily ceases. The atmosphere of unhealthy tropical climates differs but little from a vapour-bath at a temperature of between 80° and 90° Fahr.; and the dew-point in those countries, as for example on the western coast of Africa, never ranges lower than three or four degrees, nay, is sometimes only a single degree, below the temperature of the air. Placed in an atmosphere so nearly saturated with water, and of such a temperature, man is on the verge of conditions that are incompatible with his existence: conditions which may easily be induced by exposure to fatigue in a humid atmosphere under a burning sun, or other causes which excite the skin while they prevent the exercise of its natural function. The terms *Miasma* and *Malaria* may, according to the author, be regarded as almost synonymous with air at the temperature of from 75° to 85° Fahr., and nearly saturated with moisture.

2. A paper was also read, entitled, "On the Cause of the reduction of Metals from solutions of their salts by the Voltaic circuit." By Alfred Smee, Esq., F.R.S., Surgeon to the Bank of England.

The reduction of a metal from its saline solution by the agency of voltaic electricity, has, the author states, been explained in three different ways. By Hisinger, by Berzelius, and by Faraday it has been ascribed to the liberation of hydrogen in this process: Davy and others considered it as resulting directly from the attraction of the metal to the negative pole: and Daniell conceives that the metal is directly electrolysed by the action of the voltaic circuit. The author found that the ends of copper wires, placed in a solution of sulphate of copper between two platina poles in the circuit, manifest electric polarity; so that while one end is dissolving, the other is receiving deposits of copper: he also found that platina was, in like manner, susceptible of polarity, although in a much less degree than copper, when placed in similar circumstances. With a view to determine the influence of nascent hydrogen in the voltaic reduction of metals, he impregnated pieces of coke and of porous charcoal with hydrogen, by placing them, while in contact with a metal, in an acid solution, when they thus constituted the negative pole of the circuit; and he found that the pieces thus charged readily reduced the metals of solutions into which they were immersed; and thence infers that the hydrogen is the agent in these reductions. From another set of experiments he concludes, that during these decompositions, water is really formed at the negative pole; a circumstance which he conceives is the chief source of the difficulties experienced in electro-metallurgic operations when they are conducted on a large scale, but which may be avoided by a particular mode of arranging the elements of the circuit so as to ensure the uniform diffusion of the salt.

The author obtained the immediate reduction of gold, platina, palladium, copper, silver and tin from their solutions by the agency of hydrogen contained in a tube, with a piece of platinized platina in contact with the metallic salt: nitric acid and persalts of iron, on the other hand, yielded their oxygen by the influence of the same agent.

The general conclusion which he deduces from his experiments is that, when a metallic solution is subjected to voltaic action, water is decomposed, its oxygen passing in one direction, and its hydrogen in the opposite direction; the latter element performing at the moment of its evolution at the negative pole the same part with respect to a solution of sulphate of copper, that a plate of iron or zinc would perform to the same solution.

March 16, 1843.

FRANCIS BAILY, Esq., V.P., in the Chair.

William Brooke O'Shaughnessy, M.D., was balloted for, and duly elected a Fellow of the Society.

The following papers were read, viz.—

1. "On the import and office of the Lymphatic Vessels." By Robert Willis, M.D. Communicated by John Bostock, M.D., F.R.S.

That absorption is the special office of the lymphatic vessels was, until very lately, a universally received doctrine in physiology: but it is now admitted that if they exercise this faculty, it can be only to an inconsiderable extent; and physiologists of high authority have even denied that they possess any absorbing power at all. This last is the opinion of Magendie, in which the author concurs. So lately as 1841, Rudolph Wagner asserted that "neither anatomical nor physiological considerations render any satisfactory account of the import and office of the lymphatics," which thus, shorn of their ancient office, were repudiated as a superfluous apparatus in the animal mechanism. The grand organs of absorption the author believes to be the veins; and a principal object of his paper is to point out the mode in which they acquire this remarkable faculty. The principal condition which this faculty of imbibition implies, is a difference in density between the contents of the vessels which are to absorb, and the contents of those which furnish the matter to be absorbed. If the several constituent materials of the body, both fluid and solid, were to remain in the same unaltered state, both chemically and physically, there could be no interchange among them: in order that mutual penetration may take place between two elements, the one must differ from the other: that which is designed to absorb must be, with relation to that which is to be absorbed, more dense; that is, must contain a smaller quantity of water in proportion to its solid ingredients. For the continuance of the delicate processes concerned in the access and removal of the nutrient fluids, it is necessary that a difference should be established between the arterial and the venous blood in respect of density. This purpose the author conceives is accomplished by the abstraction from the former of a portion of its water by the sudoriparous glands of the skin on the one hand, and by the lymphatic vessels on the other.

That the separation of the lymph from the blood is calculated to increase its density, is proved by its chemical analysis; lymph containing from 96 to 97 per cent. of water, and blood from 77 to 82 per cent. The author regards this separation of lymph from the blood as the result of a purely vital process of the same nature as that by which the saliva and the watery portion of the urine are secreted from the circulating mass. He considers that his views are supported by the anatomical distribution of the lymphatic system: for, on the principle that organs are found in the vicinity of the places where their office is wanted, the office of the lyphatics must be general, inasmuch as the system is general. These vessels may, in fact, be regarded as the essential element of an universally distributed gland. The mode in which the lymphatics are finally connected with the blood-vessels appears also to indicate that the object in view is to keep their watery fluid separate from the blood as long as possible; for, as is well known, they do not transfer their contents into the neighbouring veins, but pour their whole fluid into the superior vena cava at the moment it is about to enter into the heart.

The remarkable manner in which the lymphatic system is developed in some of the lower tribes of animals, whose bodies are encased in an impervious horny covering, such as turtles, lizards and serpents, is adduced in further corroboration of the author's views. He regards the serous membranes as contrivances for the accommodation of a great number of lymphatics; and the intimate connexion which the function of these vessels has with the life and nutrition of internal organs he thinks is shown by the remarkable amount of disturbance consequent on inflammation, or other morbid condition of serous membranes. Finally, the author adverts to the influence which the difference of endosmotic capability engendered by the abstraction of a certain amount of water in the course of the circulation, (first between the blood corpuscles and the plasma in which they swim, and then between the liquor sanguinis and the containing channels,) must have on the capillary circulation, which he conceives it is calculated to facilitate.

2. "Further Observations on the descending fluids of Plants, and more especially the Cambium." By George Rainey, Esq. Communicated by P. M. Roget, M.D., Sec. R.S.

The author relates an experiment in proof of the sap descending from the upper to the lower part of an exogenous tree, through vessels which are continuous from the leaves to the roots; the course of these vessels being shown by the addition of a solution of iodide of potassium after they had taken up by absorption a quantity of a solution of acetate of lead. The fluids in these vessels are, he conceives, separated from the sap, which is ascending from the roots, only by the membrane of which they are composed. When the leaf-buds of a tree are vegetating, large separations are observable between the cells of the bark, and also between the bark and the wood: while no such separations are apparent when the leaf-buds are entirely inactive. These separations are various in size, and irregular in form; their parietes consist of rows of cells, piled up one above another, like the bricks of a wall: and their cavities all communicate with one another. From these and other anatomical facts, which are given in detail by the author, he concludes that the propulsion of the sap along the vessels, resulting from the operation of endosmose, will explain the descent of the cambium, which, being the nutritious portion of the vegetable fluids, corresponds in its nature to the chyle in animals.

March 23, 1843.

GEORGE RENNIE, Esq., V.P., in the Chair.

A paper was read, entitled, "Notice of an Extraordinary Luminous Appearance seen in the Heavens on the 17th of March, 1843," in a Letter to S. H. Christie, Esq., Sec. R.S., by Sir John F. W. Herschel, Bart., F.R.S.

Collingwood, March 17, 1843.

My Dear Sir,—This evening, at half-past seven o'clock, I received notice from one of my servants of a luminous appearance in the sky, visible towards the S.W., which I immediately ran out to observe, and which, as it differed in some remarkable particulars from any phenomenon of the kind I have ever before observed or seen described, I think it not unlikely to prove interesting to the Royal Society.

The evening was one of uncommon serenity and beauty: the moon, only thirty-eight hours after the full, having considerable south declination, was not yet risen. In consequence, the sun being already far enough below the horizon to leave only a faint glow of twilight in the west, the stars shone with unsubdued brilliancy, no cloud being visible in any quarter. Orion in particular was seen in all its splendour; and commencing below that constellation, and stretching obliquely westward and downwards, nearly, but not quite to the horizon, was seen the luminous appearance in question. Its general aspect was that of a perfectly straight, narrow band of considerably bright white cloud, thirty degrees in length, and about a degree and a quarter, or a degree and a half in breadth in the middle of its length; its brightness nearly uniform, except towards the ends, where it faded gradually, so that to define its exact termination at either end was difficult. However, by the best judgement I could form, it might be considered as terminating, to the eastward or following side, at, or a very little beyond, the stars ι, κ, λ Leporis, which stars (being of the fifth, or at most 5·4 magnitude) were pretty conspicuously visible; from which circumstance the degree of brightness of the ground of the sky in that region may be well estimated. Between these stars and μ Leporis, the luminous band then commenced, involving neither of them, but more nearly contiguous to κ and λ than to μ. From thence its course was towards π Eridani, which star must have been covered by it, and was not seen; this judgement of its direction having been formed by noticing that it passed clearly above γ Eridani, and as clearly below and parallel to the direction of δ, ε Eridani, which two stars being dimmed by the vapours of the horizon and the twilight, were so little conspicuous as perfectly to account for π not having been noticed. At the point of its passage between γ and δ it was still considerably bright, and as it terminated with somewhat more abruptness at a point beyond ε (then about 12° high) than at its upper extremity, I am rather disposed to consider this end as somewhat curtailed by the vapours. Making no allowance, however, for this, and estimating its visible termination at a point on a celestial globe nearly opposite ζ Eridani (which star however was not noticed at the time), the length above assigned to the luminous band (30°) has been concluded by measurement on the globe.

I am thus particular in describing the course, situation and dimensions of the band, not only as terms of comparison with other observations of it, should any have been made, but for another reason, in which consists the peculiarity of the phenomenon, and which is my sole motive for making this communication. The above situation and course, relatively to those stars, *remained perfectly unaltered the whole time it remained visible at all*, which it did for upwards of an hour from the time I first saw it, *accompanying the stars in their diurnal motion*, until the preceding end at length was extinguished in the horizon vapours with the stars adjacent, and until the light of the rising moon dimmed and at length effaced the rest, though I apprehend its intrinsic lustre to have been in progress of diminution during the last quarter of an hour or twenty minutes.

I should not forget to mention, that neither in the north-west, nor elsewhere, were any streamers or other appearances of Aurora Borealis perceptible during any part of the evening. The only other luminous appearance, the milky way excepted, was that of the zodiacal light, which I have seldom seen to greater advantage in this climate, and which extended high enough to involve the Pleiades, then about 55° from the sun.

I have said that the general aspect of the phenomenon was that of a bright white cloud. In fact, my first impression was that such was its nature; an impression immediately dissipated and ultimately converted into the contrary certainty by the following considerations and observed facts. For, in the first place, no ordinary cloud at such an angular elevation above the horizon could have received from the sun, even at the earliest hour when it was observed, anything like sufficient illumination to have presented so luminous an appearance; that luminary being then between 9° and 10° below the horizon, and the moon not yet being risen, even at eight o'clock, when I judged the light of the band by contrast with the increasing darkness of the ground of the sky to have attained its maximum, at which hour the depression of the sun was nearly 12°.

Moreover, 2ndly, about a quarter of an hour after the band was first observed, being then on the roof of my house and having a very uninterrupted view of the western horizon, I noticed the formation of a small streak of cloud about the same apparent altitude, somewhat to the north of the pyramid of the zodiacal light, and therefore nearer to the place of the sun below the horizon. The direction of this streak was horizontal, not oblique, and its hue black, not white. This cloud enlarged and became projected as a dark space within the zodiacal light, and soon after others of a less defined character formed elsewhere, all, however, without exception, dark instead of luminous.

3rdly. At the rising of the moon, about half-past eight, the light of our band, already probably on the decrease, was almost wholly effaced. On the other hand, by this time numerous lines and cirrous streaks of light cloud which had been for some time in progress of formation, and had been either wholly unseen before or only noticed by their effacing the stars behind them, became illuminated, and appeared as white streaks and patches, such as are usually observed in moonlight nights.

4thly, and lastly. Although the night was very calm, yet on watching narrowly the motions and changes of these real clouds with respect to the stars, they were perceived to *rise very slowly from the west, i. e.* in a direction nearly or quite contrary to that of the declining band.

From these united considerations, and from the extreme fixity of the band among the stars, I consider it impossible to regard it as a cloud illuminated by the sun through the medium of atmospheric refraction. The latter reason, too, is equally conclusive against its being classed with ordinary auroral bands and arcs, which, though they keep their position well enough to be regarded as at rest by a careless observer, yet, when compared with stars, are always perceived to be drifting, as it were, in some certain direction, or otherwise changing in figure and dimension.

If we look to an origin for this phenomenon beyond our atmosphere, we become involved in speculations, which, however interesting, it is not the object of this communication to enter into. On the other hand, its purpose will be answered if either it should be the occasion of eliciting corresponding observations of the same, or notices of similar phenomena already observed, or should lead to increased watchfulness on the part of meteorologists to avail themselves of occasions (which perhaps occur oftener than we are aware) of noting anything analogous in future.

I have the honour to remain,
My dear Sir,
Your very faithful and obedient Servant,
J. F. W. HERSCHEL.

Saturday, March 18, 1843.

P.S.—There having been no post today, and the above not having been finished in time for despatch last night, an opportunity is afforded me for stating that the phenomenon above described has again reappeared this evening, at the same hour and in the same situation, or rather a very little more to the north, so as to graze and partly to involve the stars κ, λ Leporis. It was also traceable in R. A. some little way beyond those stars on the following side. The horizon being more obscured by vapour tonight than last night, neither γ, δ, nor ε Eridani could be seen.

The fixity of this object among the stars on the 17th, induced me to express to a member of my family this morning an idea that it might possibly be seen again tonight, in which event its extra-atmospheric origin would become quite evident. If a thread be stretched on a celestial globe along the central line of the band as nearly as the above observations will enable us to fix it, and prolonged to meet the ecliptic, *it will strike on the actual place of the sun*. The inference seems almost unavoidable, that our band is no other than the tail of a magnificent comet, whose head at the times of both observations has been below the horizon. I await, therefore, with extreme interest, the event of further observation, but although to afford others an opportunity of observing it, it will be necessary for me to make a more immediate and public announcement, I am still desirous to place on record my first impressions respecting so remarkable an appearance, in the mode originally intended, both as a mark of respect to the Royal Society, and as pointing inquiry to other luminous "streaks" and "columns" in the sky, which have been spoken of to me as having been seen during the last summer and autumn on more than one occasion, and which in point of fact caused me to desire every inmate of my family to give me immediate notice of the appearance of anything unusual in the heavens, and thus led directly to the observations above detailed.

A paper was also in part read, entitled, "Researches into the Structure and Developement of a newly discovered parasitic Animalcule of the Human Skin, the *Entozoon folliculorum*." By Erasmus Wilson, Esq.: communicated by R. B. Todd, M.D., F.R.S.